only known to Mr. Pole through the examples of its application given in Moseley's work, and the results obtained were identical with those which would have followed from the application of the method of Clapeyron in its most improved and generalized form.

In 1858, the present writer, being then in India, had occasion to consider the condition of a continuous girder of five spans, and finding the method of Navier unmanageable, was forced to seek for some other. He first came upon the equation which he afterwards found had been for some years known in France as the "Theorem of the three Moments," and afterwards extended it, so as to take in all the conditions of the Britannia bridge and to verify all Mr. Pole's results. In this form it was absolutely identical with the equation given by M. Bélanger, and nearly so with that of M. Bresse.

The great defect in all this theory up to the present time has been that, in order to avoid an inextricable complexity, it has been necessary to consider the load in each span as uniformly distributed over it, and the moment of inertia of the section as uniform throughout each span.

In many cases these hypotheses are false, notably so in the case of the Britannia; and the conclusions are affected by their falsity, to what extent being a matter of uncertainty, though good grounds have been shown for believing that the errors cannot attain to importance.

The method now given treats these conditions, it is hoped, rigorously; and although the equations obtained are such as necessarily require some laborious computation to obtain numerical results, they are certainly by no means inextricable.

It is satisfactory to find that in the case of the Britannia, where these new conditions enter with much greater force than in most cases, their effect on the resulting stresses is very unimportant; so that the inference may legitimately be drawn that in all ordinary cases the method of Bresse may be confidently applied.

It is scarcely possible in a short abstract to give an idea of an analytical investigation. The equations obtained are of the same form as those of the previous methods, each containing, as unknown quantities, the bending moments over three consecutive supports; but the coefficients are somewhat involved functions of the varying loads and sections. An abbreviated functional notation has, wherever possible, been used, by means of which a certain degree of clearness and symmetry is preserved in expressions which would otherwise become inextricably complex.

IV. "Remarks on Mr. Heppel's Theory of Continuous Beams." By W. J. Macquorn Rankine, C.E., LL.D., F.R.S. Received December 22, 1869.

(Abstract.)

The author states that the advantages possessed by Mr. Heppel's method will probably cause it to be used both in practice and in scientific study.

With a view to the instruction of students in engineering science, he proposes an abridged way of stating the theoretical principles of Mr. Heppel's method, considering at the same time that Mr. Heppel's more detailed investigation forms the best model for numerical calculation.

He then uses Mr. Heppel's improved form of the "Theorem of the three Moments" to test the accuracy of the formulæ which he obtained in another way, and published in 'A Manual of Civil Engineering,' for the case of a uniform continuous beam with an indefinite number of equal spans, the successive spans being loaded alternately with a uniform fixed load only, and with a uniform travelling load in addition to the fixed load; and he finds the results of the two methods to agree in every respect.

V. "Remarks on the recent Eclipse of the Sun as observed in the United States." By J. N. Lockyer, F.R.S. Received December 7, 1869.

By the kindness of Professors Winlock, Morton, and Newton, I have been favoured with photographs, and as yet unpublished accounts, of the results of the recent total eclipse of the sun observed in America. I am anxious, therefore, to take the opportunity afforded by the subject being under discussion, to lay a few remarks thus early before the Royal Society.

The points which I hoped might be more especially elucidated by this eclipse were as follows:—

1. Is it possible to differentiate between the chromosphere and the corona?

2. What is the real photographic evidence of the structure of the base of the chromosphere in reference to Mr. W. De La Rue's enlarged photographs of the eclipse of 1860?

3. What is the amount of the obliterating effect of the illumination of our atmosphere on the spectrum of the chromosphere?

4. Is there any cooler hydrogen above the prominences?

5. Can the spectroscope settle the nature of the corona during eclipses?

With regard to 1, the evidence is conclusive. The chromosphere, including a "radiance," as it has been termed by Dr. Gould (the edge of the radiance as photographed being strangely like the edge of the chromosphere in places viewed with the open slit), is not to be confounded with the corona.

On this subject, in a letter to Professor Morton, Dr. B. A. Gould writes:—"An examination of the beautiful photographs made at Burlington and Ottumwa by the sections of your party in charge of Professors Mayer and Haines, and a comparison of them with my sketches of the corona, have led me to the conviction that the radiance around the moon in the pictures made during totality is not the corona at all, but is actually the image of what Lockyer has called the chromosphere.

"This interesting fact is indicated by many different considerations. The directions of maximum radiance do not coincide with those of the great beams of the corona; they remain constant, while the latter were variable.